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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/773,461	02/09/2004	Paulus Cornelis Duineveld	081468-0308101	3607
909	7590	07/18/2005	EXAMINER GUTIERREZ, KEVIN C	
PILLSBURY WINTHROP SHAW PITTMAN, LLP P.O. BOX 10500 MCLEAN, VA 22102			ART UNIT 2851	PAPER NUMBER

DATE MAILED: 07/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/773,461

Applicant(s)

DUINEVELD ET AL.

Examiner

Kevin Gutierrez

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 February 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 10-16, 22 and 24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 17-21, 23 and 25-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-9, 17-21, 23 and 25-33 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on February 9, 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>11/2/04 & 2/9/04</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species of the claimed invention:

- a. Species I - Figure 4
- b. Species II - Figure 5

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable.

2. During a telephone conversation with Jean-Paul Hoffman on July 6, 2005 a provisional election was made with traverse to prosecute the invention of 10,773,461, Species I - Figure 4. Affirmation of this election must be made by applicant in replying to this Office action. Claims 10 and its dependents are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

3. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be

accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

4. Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

Claim Objections

5. Claims 17 and 23 are objected to because of the following informalities:
- a. Page 13, Claim 17 - "...the bubbles will be further from the substrate than if no electrical potential was applied to the object." The underlined text fails to provide proper antecedent basis. Throughout examination, the examiner respectfully assumes that the underlined text is referring to the object set forth in claim 2.
 - b. Page 14, claim 23, "... wherein the first object is the substrate." The underlined text fails to provide proper antecedent basis. Throughout examination, the examiner respectfully assumes that the underlined text is referring to the object set forth in claim 2.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-6, 9, 21, 27 and 29-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi (5,610,683) in view of Klinkowski (4,569,739).

Regarding claims 1, 29, 30, and 31, Takahashi teaches

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- “an illumination system (fig. 1, #3) configured to provide a projection beam of radiation (col.4, lines 62-63);
- a support (fig.1, #5) configured to support a patterning structure which is configured to impart the projection beam with a pattern in its cross-section (col. 4, lines 66-67);
- a substrate table (fig. 1, #13) configured to hold a substrate (#2);
- a projection system (fig. 1, #4) configured to project the patterned beam onto a target portion of the substrate (col4, lines 65-66);
- a liquid supply system (col.3, lines 5-6, where liquid supply system comprises of a pressure gauge and pressure control means) configured to at least partly fill a space between the projection system and the substrate with an immersion liquid (col. 2, lines 26-28 where casing holds an immersion liquid; col.2, line 67 and col.3, line 1).”

Takahashi does not teach:

- a power source that applies an electrical potential
- a potential field generator to generate an electric field
- a force on bubbles or particles across the immersion liquid.
- means for applying charge to an object

However, having (claim 1) “a power source configured to apply a first electrical potential across the immersion liquid supplied by the liquid supply system to move at least one of bubbles and particles in the immersion liquid,” (claim 31) “applying a force on at least one of bubbles and particles in the immersion liquid provided by the

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liquid supply system by applying a charge to an object,” and (claim 29) “means for applying charge to an object,” and (claim 30) “potential field generator configured to generate an electric field” are routines in the art as taught by Klinkowski (see figure 2 and col.7, lines 5-8, where an electric potential is generated with the presence of #40 (anode) and #50 (cathode) which moves charged particles throughout a liquid. Also, particles are moved away or towards an object in an applied electric field (col. 1, lines 21-24)). Thus, it would have been obvious to one ordinary skilled in the art at the time the invention was made to modify Takahashi in a matter described above for at least the purpose to filter undesired particles in an immersion liquid.

Regarding claim 2, Klinkowski further teaches “wherein the first electrical potential is applied to a first object (see fig. 2, where #51 is the object).”

Regarding claim 3, Klinkowski further teaches “wherein the first object is in contact with the immersion liquid (see fig.2, where the liquid fills #68 (separate chamber) and is contact with #51).”

Regarding claims 4 and 32, Klinkowski further teaches “wherein the first object forms a border of the space (fig.2, where #51 is positioned to provide a vertical border).”

Regarding claim 5, Klinkowski further teaches “wherein the first electrical potential is applied across the immersion liquid in the space (col. 7, lines 5-6).”

Regarding claims 6 and 33, Klinkowski further teaches “wherein the first object is in contact with the immersion liquid in a supply channel upstream of the space (fig.2, where #51 is located near #71 (port); col.7, lines 65-66).”

Regarding claim 21, Klinkowski further teaches “wherein the first electrical potential is of different polarity to an electrokinetic potential of a surface of at least one of bubbles and particles in the immersion liquid (fig. 2, within #65 (separate chamber), #68 and #52 are particles that move in opposite directions from the particles of #44 and #54 due to charge; col.7, lines 38-40).”

Regarding claim 9, Takahashi teaches a substrate utilized in a immersion lithographic system. Takahashi does not teach an electrical potential applied to an immersion liquid to repel bubbles or particles away from the substrate.

However, having “the first electrical potential is effective to exert a force on at least one of bubbles and particles in the immersion liquid in a direction away from the substrate” is routine in the art as taught by Klinkowski (col. 7, lines 38-40, where it would have been obvious to dispose a substrate near the electrodes where various particles will move away or towards the substrate). Thus, it would have been obvious to one ordinary skilled in the art at the time the invention was made to modify Takahashi in a matter described above for at least the purpose to maintain a uniform immersion liquid near the vicinity of the substrate.

Regarding claim 27, Klinkowski further teaches “wherein the first object is positioned on a barrier member which extends along at least a part of a boundary of the space (fig. 2, where #51 forms a vertical border and #66 is a member that extends throughout #65 (separate chamber).”

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8. Claims 7, 8 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi in view of Klinkowski and in further view of Goodley et al (US 2004/0036019).

Regarding claims 7 and 8, modified Takahashi teaches the claimed limitations except an electric potential applied outside the space and across a liquid in a supply system.

However, (claim 7) “wherein the first electrical potential is applied across the immersion liquid outside the space” and (claim 8) “wherein the first electrical potential is applied across the immersion liquid in the liquid supply system” are routines in the art as taught by Goodley et al ([0011], lines 3-5, where the electrode can generate a field across the nozzle from which the analyte is ejected from). Thus, it would have been obvious to one ordinary skilled in the art at the time the invention was made to further modify Takahashi in a matter described above for at least the purpose to achieve a particle-free immersion liquid.

Regarding claim 28, modified Takahashi teaches the claimed limitations except a liquid supply system having means for moving bubbles or particles with the application of a voltage.

However, “the liquid supply system having means for moving at least one of bubbles and particles in the immersion liquid supplied by the liquid system by the application of a voltage” is routine in the art as taught by Goodley et al ([0011], lines 3-6 and [0042], lines 3-4, where voltage is applied to an electrode to generate an electric field near the vicinity of a nozzle from which liquid is ejected). Thus, it

would have been obvious to one ordinary skilled in the art at the time the invention was made to further modify Takahashi in a matter described above for at least the purpose to reduce the quantity of unwanted particles dispersed from a liquid supply system.

9. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi in view of Klinkowski and in further view of Reis et al (4,013,554).

Regarding claim 17, modified Takahashi teaches all the claimed limitations except an exerted force on bubbles or particles with the bubbles being further from the substrate.

However, "wherein the first electrical potential is effective to exert a force on at least one of bubbles and particles in the immersion liquid in a direction such that when in the space, the bubbles will be further from the substrate than if no electrical potential was applied to the object" is routine in the art as taught by Reis et al (col.4, lines 66-68 and col.5, line 1, where the hydrogen bubbles may be left in place whereas the other particles of modified Takahashi are mobile). Thus, it would have been obvious to one ordinary skilled in the art at the time the invention was made to further modify Takahashi in a matter described above for at least the purpose to obtain a more uniform immersion liquid.

10. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi in view of Klinkowski and in further view of Akutsu et al (6,207,331).

Regarding claims 18 and 19, modified Takahashi teaches the claimed limitations except for an electric potential set between $\pm 5\text{mV}$ and $\pm 5\text{V}$ or between 10mV and 500mV .

However, (claim 18) “wherein the first electrical potential is between $\pm 5\text{mV}$ and $\pm 5\text{V}$ ” and (claim 19) “wherein the first electrical potential is between 10mV and 500mV ” are routines in the art as taught by Akutsu (col. 15, line 1, where the applied voltage is preferably 5 V or less). Thus, it would have been obvious to one ordinary skilled in the art at the time the invention was made to further modify Takahashi in a matter described above for at least the purpose to reduce undesired particles in an immersion liquid.

11. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi in view of Klinkowski and in further view of Ogawa et al (5,223,331).

Regarding claim 20, modified Takahashi teaches the claimed limitations except an electrical field set up to 500mV/mm .

However, having “wherein the first electrical potential is effective to set up an electrical field of up to 500 mV/mm ” is routine in the art as taught by Ogawa et al (col.5, lines 1-2, where the generated electric field is about 5 V/cm , which is nearly equivalent to the claimed limitation). Thus, it would have been obvious to one ordinary skilled in the art at the time the invention was made to further modify Takahashi in a matter described above for at least the purpose to maintain a relative particle-free immersion liquid.

12. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi in view of Klinkowski and in further view of So (US 2004/0017989).

Regarding claim 23, modified Takahashi teaches all the claimed limitations except “wherein the first object is the substrate.”

However, “wherein the first object is the substrate” is routine in the art as taught by So ([0038], lines 7-8, where an voltage is applied to a substrate).

13. Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi in view of Klinkowski, as applied to claim 2, and in further view of Arimoto et al (5,289,001).

Regarding claims 25 and 26, modified Takahashi teaches the claimed limitations and further teaches the first object that forms a border of space. Modified Takahashi does not teach a first object that lies in the optical axis and is positioned distal from the optical axis.

However, (claim 25) “wherein the first object lies in the optical axis of the apparatus” and (claim 26) “is positioned distal from the optical axis of the apparatus” are routines in the art as taught by Arimoto et al (col. 4, lines 50-52 where there are central electrodes, which their distances can be varied, of the optical axis). Thus, it would have been obvious to one ordinary skilled in the art at the time the invention

was made to further modify Takahashi in a matter described above for at least the purpose to maintain a cleaner region near the projection beam.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. W.C. York et al (3,527,684) disclosed a development of an electrostatic image and Chow et al (6,413,401) discloses a microfluidic system using electrokinetic forces.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Gutierrez whose telephone number is (571)-272-5922. The examiner can normally be reached on Monday-Friday: 7:30 a.m. - 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on (571)-272-2258. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



William Perkey
Primary Examiner

Kevin Gutierrez
Examiner
Art Unit 2851

July 12, 2005